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Isometric Projection.

A CUBE is defined as one of the solid bodies, having six equal square sides, twelve boundary lines of equal length, eight corners, and six diagonal planes. The following is a simple mode of forming a cube within a given circle: Let *a* Fig. 1, Plate 15, be the given circle. Through the centre *a* draw a line or diameter *b a c*, dividing the circle into exactly equal and similar parts. Next divide the right-hand semicircle *c b d e* into three equal parts in the points *d* and *e*, and the left-hand semicircle *c g f b* similarly in the points *g* and *f*. Next join the points *g c, c d, d e, e b b f, f g*, and from the centre *a* draw lines to *g* and *d; g c, d e, b f* is the cube required. Fig. 2 shows the cube shaded.

But while this is a ready mode of delineating a cube within any given circle, it must be remembered that this does not enable an exactly correct isometrical projection of a cube of which the side is given. Thus: suppose the line *a b*, Fig. 2, to represent the length of one of the sides of a cube, of which it was desired to have an isometrical projection; if this projection was made, as say Fig. 1, the length of the corresponding side, *g c*, Fig. 1, would not be the same as *a b*, but less. A line, therefore, when projected isometrically, is less than the line from which it is projected, and this is in proportion of 9 to 11; a line, then, 11 inches long, when projected isometrically, will be only 9 inches long. A method is therefore required by which we can project or draw a cube isometrically of which the cube is given. This is done below. Let *a b*, Fig. 3, be the length of one of the boundary lines of a cube of which *a b c d* is the side. Draw the diagonals *a b c d*, and from *b* a line *b e*, cutting the diagonal *c a*, so as to make the angle *d b e* equal to 30°. Then from any point, as *a*, Fig. 4, with radius equal to the distance *b e*, Fig. 3, describe a circle, and divide this with the same distance into six equal parts in the points *c d e f* and *g*, which being joined as in Fig. 1, will form a cube of which the side *g f* will be an isometrical projection of *a b*, Fig. 3. To form the angle *d b e* of 30°, let *a c b d*, Fig. 5, be the diagonals of the square *a b c d*, Fig. 3, then from point *a*, corresponding to point *b*, Fig. 3, with a radius of 60°, taken from a scale of chords, describe the arc *e f;* then from the same scale of chords take the distance 30°, and set this off from the point *e* to the point *f;* from *a* draw *a f; b a f* is an angle of 30°.

An isometrical line being as above stated in proportion of 9 to 11 to a line of which it is the projection, an isometrical scale may be made by which a series of cubes may be projected in correct isometrical perspective. This scale may be made by drawing two lines, *a b, b c*, Fig. 6, at right angles, making *b c* nine elevenths of the line *a b*, and joining *c a*. Then make the line *a b* to represent an ordinary scale, say of eighths of an inch or inches, and suppose the point *d* to represent the portion of the sixth inch, draw *d e* parallel to *a c*, cutting *b c* in *e*. Then the distance *b e*, taken in the compasses, will be the isometrical projection of a line, say 6 inches long, of which the correct scale is given in the line *a b*. The use of this scale in projecting circles will be fully described hereafter.

As before defined, a cube is a solid body having six sides, of which all the sides are equal; in the isometrical projection of a cube, as in Fig. 2, three of these sides are shown; of these three we designate the side *c* the upper side, *d* the "left hand," and *e* the "right hand" sides. Now by cutting these sides by lines parallel to them the representation of right-lined and rectangular objects will be obtained with great facility.

Fig. 8 represents the method of making a "scale of tangents," useful in cutting isometrical planes at any angle.

The remaining figures will be explained in another paper.

(To be continued.)

Intercommunication.

THIS department is intended to furnish, for the benefit of all our readers, practical information regarding the art of manipulating wood by hand or machinery; and we trust that every reader of our paper will make the fullest use of it, both in asking and answering. All persons possessing additional or more correct information than that which is given relating to the queries published, are cordially invited to forward it to us for publication. All questions will be numbered, and in replying it will be absolutely necessary, in order to secure due insertion, that the NUMBER and TITLE of the question answered should be given; and in sending questions, the title of key-words of the question should be placed at the head of the paper. Correspondents should in all cases send their addresses, not necessarily for publication, but for future reference. We also request that all questions or answers be written on separate slips of paper, and addressed to the Editor. Notes of practical interest will be welcome at all times. When drawings are sent to illustrate answers to questions, or for full pages, they should be on separate slips, and should be drawn in ink on clean, white paper. Short questions, requiring short answers, may be asked and answered through the agency of postal cards.

When answers to questions are wanted by mail, the querist must send a stamp for return postage.

Queries.

6. SCREW-DRIVER.—Can any of your readers tell me the reason why a screw-driver with a long blade will drive a screw with greater ease than one with a shorter blade?—GAD.

7. MITRE.—I would like to know whether there are many joiners that are able to cut a true mitre "by the eye," without the aid of a mitre-box or templet? I have frequently cut mouldings, stops, and other work that required mitring without a box or templet, and the joints have been as true as if cut in a box.

Perhaps there are many other joiners that can cut a mitre as true as I can without aids, but I have never met any of them.—Newark.

8. Wardrobe Design.—I should be thankful if some of your readers would favor me with a design for a lady's wardrobe 3 feet wide and about 7 feet high. I should like it to have a nice panel door and a drawer below that can be drawn out without opening the door. I should like it also, if it could be so arranged, that the whole thing could be taken apart and put together without injuring it. —Ned.

9. Moulding Cutters.—I want to temper some moulding cutters for a "sticking machine;" what color should I leave the steel to insure them a good temper?—Moulding Machine.

10. Bridging.—Is it better to bridge joists with "herring-bone bridging" than to fit solid plank with ends to joists between the floor timber?—Scratch-awl.

11. Glue.—How can mica be prepared so as to answer for glue? I can get plenty of mica where I am, and I am informed that a good glue can be manufactured from it, and what I want to know is how to prepare it?—Tenn.

12. Painting.—1st. How can I estimate the amount of paint required to cover a building of a given size? 2d. How much lead is required to a given quantity of oil, or in what proportion used? 3d. How many yards of surface should a good man paint in a day? 4th. What is the average cost of good white lead and oil? 5th. What is the best kind of drier used for house-painting? I will be obliged to any of your readers who will kindly answer the foregoing questions through the Wood-Worker.—Bound Brook.

Answers.

We wish it distinctly understood, that we do not hold ourselves responsible for the accuracy or reliability of answers furnished to this department by our correspondents.

We cordially invite our readers to take an active part in this department, as we are confident that much good can be accomplished by a free interchange of ideas and opinions in regard to subjects connected with the art of wood-working.

Many persons are afraid to write to a public journal because of their lack of literary attainments; to such we would say: Give us your ideas in such language as you can command, and leave the rest to us. It is ideas and opinions we want, such as may be of use to the hard-working man.

1. Plane Irons.—Butcher's plane irons are numbered 1, 2, 3, etc., to tell the sizes. —Square.

1. Plane Irons.—I am informed that the numbers on Butcher's plane irons are the numbers of the men who make them. Thus No. 2 was forged by the man who is known in the forging shop as No. 2, the number of the fire he worked at. By this method bad or defective irons can be traced to their makers.—Sheffield.

2. Picture Frames.—Size joints with glue, then let dry, glue again, then put together and then brad for good work.—Brad.

4. Combination Planes.—The Stanley Rule and Level Co. manufacture the best combination plane, but the best are scarcely worth chest room; when you go to buy, don't!—Hard Case.

5. Hardwood Pins.—Use dry hickory, of course. Green hickory used for pins would "dose" and be worthless in twelve months.—Maine.

Japanese Houses.

The Japanese houses are constructed in a very singular style—one peculiar to themselves—they build a house within a house.

Among the better classes the outer houses are generally built of stone, or of a bamboo frame-work, or lath, which is covered over with a thick and tenacious mud; this being covered with a coat of plaster is either painted in some sombre color or becomes bleached by exposure to the weather. Over the surface of the buildings mouldings are often arranged in diagonal lines, and these, when painted white, contrast with the dark background behind, and lend to the houses a curious piebald appearance. In the construction of the roofs colored tiles are used, alternately black or white; the eaves extend low down in front of the walls so as to form a protection to the inmates from the sun, and the oiled windows, made of paper, effectually keep out the rain. Besides these are movable shutters, which by night are secured to the posts which support the verandas.

The inner, or house proper, consists of a large frame-work raised a few feet above the ground, and is divided into several rooms by means of panels, which can be removed if necessary. The raised floor of the inner abode is covered with colored mats, made soft and thick by being lined with straw, and extend over the entire area of the house. The mats covering the floor are very neatly woven and bound with colored cloth, and as the law prescribes that they shall be of a uniform size, measure four by six feet each, and are placed upon the floor so carefully that they appear to be of one piece. The people sit upon these mats to eat their meals, converse with their friends and neighbors, and lie down at night to sleep, when a quilted mat for a covering, and a hard box for a pillow is provided.